



ontario hydro research division

To Mr. D. Comissiong
Director of Marketing
Operations

SURVEY OF WOOD DRYING KILNS IN THE PROVINCE OF ONTARIO

J.T. Strack/B. Howell

A survey of wood industry experts and dry kiln operators was undertaken in October and November of 1983. The purpose of the survey was to gather data on wood kilns in the province and to assess customer attitudes towards dehumidifying kilns. Sources indicate that these systems are better suited for drying hardwoods. It was also determined that the majority of wood dried in Ontario is softwood.

INTRODUCTION

A brief survey of wood drying kilns in Ontario was carried out during October and November of 1983. The survey included telephone interviews of manufacturers, kiln users, and wood industry experts as well as a literature search. The purpose of the study was to establish the number, type and size of wood kilns in Ontario and to provide initial data on customer attitudes on heat pump dehumidifiers versus heat and vent kilns.

NUMBER OF KILNS

Data on the number of kilns was gathered by talking to two kiln suppliers, wood industry experts and by reviewing government publications. The dry kiln suppliers contacted were Coe (previously Moore Canada) and Westaire who subcontracts their kiln construction. One of their subcontractors is Salton Fabrication Kilns. In addition, Forintek Canada Corporation, a forest products research laboratory, was contacted concerning industry practices, attitudes, as well as data on the number and location of wood kilns.

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There is difficulty in trying to get an exact figure on the number of kilns in the province. One kiln manufacturer suggested that company bankruptcies and ownership changes affect the accuracy of their records. What is more, some kilns are user constructed.

Three lists of kiln sites are provided in Appendix A. The first two provide lists of sites for two major kiln suppliers, while the third is from a government publication titled "Primary Wood Using Industries in Ontario 1983"/1/. There is some duplication within the three lists and this has been indicated where possible in Appendix A. A summary of the data is shown in Table I.

TABLE I

Kiln Supplier	Type of Equipment	Number of Sites	Number of Kilns
1. Westaire	HP	11	35 est
2. Coe	H/V	107	339
Total 1 and 2	-	118	374
3. Data Reference/1/	-	51	163 est
Total 1, 2 and 3 (Duplicates Removed)	-	140	450 est

HP - heat pump dehumidifier kiln,
H/V - conventional heat and vent kiln
est - estimate based on 3.2 kilns per site

It is believed that the two kiln suppliers contacted have sold the majority of the commercially supplied kilns (both conventional and dehumidifier types).

Based on discussions with the people contacted (see Appendix C for a list of names and addresses), it is felt that there are about 40 to 50 heat pump dehumidifier kilns in Ontario. About 35 of these have been supplied by Westaire.

Reference 1, the government publication, lists only the kiln sites which also have saw mills. Some kiln operations purchase their lumber and are not included in the government publication.

Of the 51 kiln sites listed in Reference 1, 29 of the sites are duplicated in the lists provided by the major kiln suppliers.

The total number of kiln sites in the province is then estimated at the number supplied by all three sources less the duplications (ie, $11 + 107 + 51 - 29 = 140$ kiln sites). Based on the Coe data, an average site has 3.2 kilns and therefore it's estimated that there are 450 kilns in Ontario. About 90 (20%) of these are expected to dry hardwoods/1/.

ATTITUDES - RESULTS OF SAMPLE SURVEY

Twelve kiln sites were polled in order to get more specific information on kiln operation and attitudes toward dehumidifier kilns. Most of the kilns in the group are located in southern or eastern Ontario and are used to dry hardwoods for furniture production. The softwood kilns (stud mills and dimension lumber) tend to be in the northern regions of the province. The sample poll included two stud mill/kiln operations. Table 2 summarizes responses to the telephone survey.

The response to heat pump dehumidification ranged from mild interest to dislike for any system using electricity because of its perceived high cost. Of the twelve polled, nine had some knowledge of heat pump dehumidification. A favourable attitude, with a desire for more information on these systems, was shown by five in the group. Two of these five have heat pump kilns already. Four showed feelings of indifference to learning more, while the others showed unfavourable attitudes.

The unfavourable responses were generally caused by a perception that electricity is too expensive, or that the performance of heat pumps doesn't live-up to manufacturers' claims.

In many cases the kilns have some of their heat supplied by waste wood products and thus switching to electrical energy is not generally considered by the kiln owner. It should be noted that the availability of waste wood does not exclude the use of dehumidifying kilns. The Listowel site has three dehumidifying kilns that use heat from waste wood as a supplemental heat source.

Some of the contacts felt that dehumidifiers are better suited for hardwood than softwood drying. One explanation has to do with the maximum water extraction rate possible with softwoods and hardwoods. Dehumidifiers operate most efficiently with a constant dehumidification load or water extraction rate. Softwoods contain more free water and therefore have a high initial dehumidification load which tapers off rapidly. On the other hand hardwoods dry with a more constant water extraction rate making them more compatible with heat pump systems. In addition it was suggested by Forintek that softwood mill/kiln operations have more abundant supplies of waste wood to generate

TABLE 2

Site	Location	No of Kilns	Total Capacity (HHP)	Fuel (Backup)	Age (yrs)	Insulation	End use of Wood	Familiarity With HP	Attitude Toward HP Dehumidifying	Are You Interested in Further Correspondence
1	Alliston	2	65	oil	30	- 2" x 6" cedar stud wall with drywall and heat reflecting paint - roof is a 6" thick cedar deck	furniture	yes (some)	favourable (would like more information)	yes
2	Kilna	3	62	waste wood (natural gas)	1 - 5 1 - 15 1 - 20	- 2 older kilns are cement block - the newer in an aluminum box with 1-1/2" styrofoam	furniture	little	favourable	yes
3	Hawkebury	8	270	oil	2 - 5 6 - 10	cement blocks	furniture	no	favourable	yes
4	Scarborough	8	300	waste wood and gas	2 - 12 6 - 15	1-1/2" foam panel	furniture and cabinetry	yes	unfavourable	no
5	Bolton & Toronto	12	350	electricity heat pump	11 - 9 1 - 1	3-1/2" styrofoam 12" fibreglass in ceiling	furniture (all hardwood)	yes	favourable	n/a
6	Ottawa	1	25	waste wood & heat pump	50	asbestos	furniture, stairs	no	indifferent	no interest
7	Listowel	3	75	waste wood & heat pump	3	yes	furniture	yes	favourable	n/a
8	Campbellford	1	30	natural gas	7	yes	furniture & component parts	yes	feels HP ing is just as costly	no interest
9	Flaira	6	84	waste wood & coal	15	yes	furniture	no	indifferent	no interest
10	Collingwood	3	150	waste wood (natural gas)	36	no	furniture	yes	unfavourable	no interest
11	South Brock Falls	5	610	waste wood (natural gas)	3 - 13 2 - 8	7	2" x 4" studs (softwood) literature	yes	satisfied with present operation	some interest in further literature
12	Kirland Lake	1	210	natural gas	10	3" fibreglass	2" x 4" studs (softwood) 2" x 3" studs (softwood)	yes	(has a HP kiln outside of this province) unsatisfied with factory drying time about 4 times as long	no interest

steam than hardwood operations. These considerations make an electric dehumidification system less appealing to the softwood industry.

CONSTRUCTION DETAILS

The sites contacted generally had more than one kiln, with the average being 3.2 kilns. Kiln age ranged from 1 to 60 years with the average being 13.6 years.

The kilns have a general range of sizes, they are:

Typical Dimensions

20 - 25 mfbm	not available
20 - 35 mfbm	26' x 30' x 16'
40 - 45 mfbm	26' x 30' x 21'
50 - 55 mfbm	26' x 30' x 25'

These are only typical sizes. Consultations with manufacturers shows that kilns are built to the needs of the wood industry and board length varies greatly.

Canadian suppliers of wood kiln dehumidifiers are:

- Coe, Dealer for Nyle (Brampton, Ontario)
- Westaire (Mississauga, Ontario)
- Uraken (St-Eustache, Quebec)
- Indusco (Toronto, Ontario)

Kilns are constructed from:

- wood
- concrete block
- bricks
- poured concrete
- glazed tile
- aluminum
- stainless steel
- fibreglass

Kilns are insulated with:

- fibreglass
- foam glass
- polystyrene
- styrofoam
- asbestos

Many of the kilns are insulated but to little extent. The insulation would likely have to be upgraded should retrofitting of a heat pump dehumidifier be implemented.

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REFERENCES

1. Ministry of Natural Resources, "Primary Wood-Using Industries in Ontario 1983".

APPENDIX A

TABLE A1

LIST OF INSTALLATIONS SUPPLIED BY WESTAIRE

<u>LOCATION</u>	<u>FIRM</u>
Bolton	Ontario Hardwoods
Toronto	Ontario Hardwoods
Aurora	Attridge Lumber
King City	Shenstone
*Port Arthur	Port Arthur Planning Mills
Atikokan	Hemingwood
Dryden	Karl Berger
Gormley	Slater Lumber
St. Catharines	Amber Stairs
Waterloo	Lazy Boy Chair
*Listowel	Andrew Malcolm Furniture

* Also reported in Reference/1/.

TABLE A2

LIST OF INSTALLATIONS SUPPLIED BY COE (FORMERLY MOORE CANADA)

<u>Location</u>	<u>No of Kilns and Size (ft)</u>	<u>Holding Capacity in MBF</u>
<u>Alliston</u>		
Peter Thomson & Sons	2 - 24 x 52	65
<u>Angus</u>		
Dept of Lands & Forests	8 - 10 x 19	cones
<u>Bancroft</u>		
Bancroft Lumber Ltd	1 - 20 x 52	30
<u>Beamsville</u>		
Canadian Wood Products Ltd	1 - 12 x 30	15
<u>Belleville</u>		
McFarlane Woodenware Co Ltd	1 - 24 x 50	37
Bob Peake Wood Products	1 - 10 x 20	6
<u>Bolton</u>		
Premium Forest Products	2 - 19 x 22 SL	40
<u>Braeside</u>		
Gillies Bros.	5 - 14 x 42	
(Consolidated Bathurst Inc)	6 - 28 x 68	
	4 - 14 x 68	675
<u>Burks Falls</u>		
Thompson - Heyland Lumber Co	2 - 19 x 104	50

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Chapleau</u>		
*Chapleau Lumber Co Ltd	2 - 30 x 104 PF	300
*J.E. Martel & Sons Ltd	1 - 30 x 78 PF	110
*A & L Lafrenier Lumber Ltd	1 - 30 x 104 PF	150
	1 - 30 x ? (Austin Lbr)	
<u>Chelsey</u>		
Heirloom of Cda Ltd	1 - 20 x 34	20
Krug Bros. of Cda Ltd	2 - 17 x 25	30
<u>Clarkson</u>		
Ontario Research Foundation	1 - 3 x 5 lab kiln	0.5
<u>Clinton</u>		
Sherlock-Manning Pianos Ltd	1 - 18 x 19	15
<u>Cochrane</u>		
*J.H. Normick Inc Cochrane Div	2 - 30 x 104 PF	350
<u>Collingwood</u>		
Kaufman Furniture Ltd	3 - 24 x 82	240
<u>Dubreuilville</u>		
*Dubreuil Bros Co Ltd	1 - 26 x 72	100
	1 - 28 x 78 PF	100
	1 - 30 x 88 PF	100
<u>Dundas</u>		
Ormerod Bros.	3 - 27 x 35	25
	1 - 24 x 33 PF	60
	2 - 27 x 34	
Valley City Mfg	3 - 18 x 22	60

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Durham</u>		
Kroehler Mfg Co	3 - 17 x 45	90
<u>Eganville</u>		
R.G. Reinke & Sons	1 - 19 x 34	30
<u>Elmira</u>		
Roxton Furniture (Elmira) Ltd	2 - 18 x 18 2 - 18 x 22 1 - 20 x 40	135
<u>Elora</u>		
Elora Furniture Co	1 - 18 x 23 SL 1 - 18 x 30 SL 1 - 20 x 29 SL PF	62
<u>Emo</u>		
*Manitou Enterprises	1 - 30 x 52 PF	50
<u>Fenelon Falls</u>		
Allen Wood Products Ltd	1 - 21 x 22	20
<u>Galt</u>		
Robert Moore Ltd	3 - 26 x 38 1 - 23 x 38 PF	90 30
<u>Goderich</u>		
Goderich Mfg (Selinger Wood Prod)	1 - 26 x 50 3 - 18 x 20 SL 1 - 24 x 50 2 - 28 x 90	300

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Golden Lake</u>		
Wallace Mundt Forest Prod Ltd	1 - 18 x 40	Basket Bottoms
<u>Gravenhurst</u>		
Rubberset Co Ltd	3 - 16 x 36 1 - 18 x 40	90
<u>Grimsby</u>		
Canadian Wood Prod Ltd	2 - 18 x 56	Baskets
<u>Hamilton</u>		
Lawson Lumber Co Ltd	1 - 18 x 34	35
National Steel Car Corp Ltd	3 - 21 x 119	300
Olaf Lumber Ltd	3 - 24 x 34 1 - 24 x 52	140
<u>Hanover</u>		
Hanover Wood Prod Ltd	1 - 22 x 50	26
Sklar Peppler Ltd	1 - 20 x 30 1 - 20 x 53 1 - 40 x 29 SL PF 1 - 20 x 29 SL PF 2 - 20 x 26 SL	150 40
<u>Harcourt</u>		
*G.W. Martin Lumber Co Ltd	6 - 30 x 52 PF	450
<u>Hawkesbury</u>		
*Albert LaRocque Lumber Co	2 - 40 x 26 SL 2 - 20 x 26 SL 2 - 40 x 29 SL 2 - 20 x 29 SL	90 40 90 40

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Hearst</u>		
*Custom Sawmill (Levesque)	1 - 30 x 97 HT	125
*The Gosselin Lumber Co Ltd	1 - 30 x 87 PF	125
*LeCours Lumber Ltd	2 - 30 x 87 PF	250
*United Sawmill	3 - 30 x 87 PF	375
<u>Hudson</u>		
*McKenzie Forest Products Inc	1 - 30 x 104 PF Energex	200
<u>Huntsville</u>		
*Weldwood Canada Ltd (New Plant)	6 - 38 x 28 SL	240
	2 - 20 x 28 SL	40
(Old Plant)	2 - 18 x 84	80
<u>Ingersoll</u>		
Ingersoll Casket Co Ltd	1 - 17 x 40	20
<u>Kenora</u>		
Ont Minnesota Pulp & Paper (Boise Cascade Cda Ltd)	2 - 30 x 70 PF	150
<u>Kitchener</u>		
Conestoga College of Applied Art	1 - 5 x 8 PF	1
Dominion Electrohome Ind	3 - 24 x 52	120
	1 - 18 x 52 HT	20
H. Krug Furniture Co Ltd	1 - 20 x 50	26
<u>Lindsay</u>		
J.A. Arnburg & Co Ltd	1 - 24 x 34	22
<u>Longlac</u>		
*Kimberly Clark of Cda Ltd	1 - 20 x 120 PF	200
	1 - 30 x 72 DT	

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Manitoulin Island</u>		
Green Cedar	1 - 30 x 34	
<u>Maple</u>		
Cadillac Lumber Co Ltd	3 - 18 x 26 SL	60
<u>Mattawa</u>		
U.O.P. Mfg	2 - 28 x 50	90
<u>Meaford</u>		
Stanley Knight Ltd	2 - 20 x 86	
	1 - 20 x 54	170
Knights of Meaford	1 - 20 x 100	65
<u>Milverton</u>		
Honderich Furniture Co Ltd (Electrohome)	1 - 18 x 54	17
<u>Napanee</u>		
Gibbard Furniture Shops Ltd	3 - 22 x 34	66
<u>Newmarket</u>		
Office Specialty Mfg Co Ltd	2 - 20 x 36	42
<u>North Bay</u>		
R. Laidlaw Lumber Co Ltd	1 - 15 x 52	
	1 - 27 x 52	
	1 - 27 x 52 PF	125
Laidlaw-Goodwood Industries	1 - 30 x 54 PF	100
<u>Orillia</u>		
Canada Wood Specialty Co Ltd	3 - 30 x 52 PF	270
	10 - 20 x 29 PF	300

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Oshawa</u>		
Peacock Lumber Co	4 - 24 x 34	100
<u>Ottawa</u>		
Forest Products Lab	1 - 10 x 20 PF 1 - 12 x 17 masonry 2 - 5 x 8 PF	8
<u>Parry Sound</u>		
Martin Lumber	4 - 20 x 29 SL PF	200
<u>Pickering</u>		
Newmar Window Mfg Co. (Pickering Sash)	2 - 20 x 25 SL PF	40
<u>Pembroke</u>		
Collmac Lumber	6 - 20 x 28 SL 2 - 30 x 56 PF	150 100
<u>Peterborough</u>		
Canadian General Electric Co	1 - 20 x 34	23
Peterborough Lumber Co Ltd	1 - 20 x 50	26
<u>Port Loring</u>		
Martin Lumber	4 - 20 x 26 SL	100
<u>Preston</u>		
Canadian Office & School Furn	1 - 12 x 50 2 - 20 x 50 2 - 20 x 50	155
Preston Furniture Co Ltd	1 - 20 x 50	

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Renfrew</u>		
Lindal Lumber	1 - 20 x 87 HT	150
<u>St. Thomas</u>		
*Elgin Handles Ltd	1 - 17 x 28	15
	1 - 22 x 30	30
<u>Sapawe</u>		
Jim Mathieu (Domtar Ltd)	2 - 28 x 66 PF	200
	1 - 56 x 66 YD (unused)	
<u>Sault Ste Marie</u>		
*Weyerhaeuser Cda Ltd	4 - 28 x 100	310
	1 - 17 x 100	40
Soo Mill & Lumber Ltd	2 - 28 x 32 BL	60
	1 - approx same size CB	
<u>Smooth Rock Falls</u>		
*Abitibi Paper Co Ltd	4 - 40 x 40 SL PF	480
<u>Strathroy</u>		
Arc Industries	1 - 20 x 24 SL	20
Philips Electronic Ind	2 - 19 x 52	80
<u>Temagami</u>		
*William Milne & Sons Ltd	1 - 26 x 52	50
	16 - 20 x 40 YD	640
	2 - 20 x 24 SL	40

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Terrace Bay</u>		
*Kimberly Clark of Cda Ltd	2 - 30 x 70	300
<u>Thessalon</u>		
*Midway Lumber Co	3 - 20 x 26 SL 1 - 40 x 29 SL 2 SL	125
<u>Thunder Bay</u>		
*Northern Wood Preservers Ltd	2 - 30 x 104 PF	400
Dynast Forest Products	1 - 30 x 104 HT	
<u>Tillsonburg</u>		
Livingston Wood Mfg Ltd	2 - 24 x 50	100
<u>Timmins</u>		
*Rudolph McChesney Lumber Co	1 - 20 x 66	50
*Malette Lumber Limited	1 - 20 x 78 PF	110
	1 - 30 x 120 PF	200
Timmins Wood Distributors Inc	2 - 20 x 18 SL	30
<u>Toronto</u>		
Robert Bury & Co Ltd	3 - 20 x 34 2 - 11 x 34	100
Floorco Ltd	3 - 28 x 20 SL	50
Jones Wood Specialties	2 - 21 x 33 SL PF	
	1 - 31 x 25 SL PF	69
University of Toronto	1 - 10 x 6 PF	2
<u>Tweed</u>		
Jos. Rashotte Co Ltd (Martin)	1 - 23 x 48	35

* Also reported in Reference 1

TABLE A2 (Cont'd)

Location	No of Kilns and Size (ft)	Holding Capacity in MBF
<u>Walkerton</u>		
*Bogdon & Gross Furniture Co Ltd	1 - 26 x 36 SL	105
	1 - 26 x 43 SL	
	1 - 26 x 30 SL	
Canada Spool & Bobbin	2 - 22 x 24 SL	120
	1 - 18 x 24 SL	
	2 - 22 x 24 SL	
	1 - 34 x 27 SL	
<u>West Hill</u>		
Kingston Road Planning Mills	2 - 18 x 26 SL	40
<u>West Lorne</u>		
Erie Flooring	2 - 20 x 125	240
	3 - 18 x 24 SL	
	2 - 18 x 24 SL	
Milner Rigsby Co Ltd	1 - 18 x 24 SL PF	300
	1 - 19 x 25 PF	
	8 - 20 x 29 PF	
<u>Weston</u>		
MacMillan Bloedel	3 - 18 x 23 SL	100
	1 - 13 x 20 SL	
	3 - 11 x 35	
	2 - 30 x 58 PF	50
Satin Finish Hardwood Flooring	2 - 31 x 36 SL + 3 - SL	50
Toronto Woodmoulding	1 - 14 x 34	12
	2 - 20 x 28 SL PF	
Craftline Industries	4 - 20 x 26 SL	
<u>White River</u>		
*Abitibi Paper Co Ltd	2 - 30 x 104	360
<u>Wingham</u>		
Lloyd-Truax Ltd	1 - 30 x 54	156
(Premium Forest Prod) New Plant	1 - 30 x 66	

* Also reported in Reference 1

TABLE A3

LIST OF INSTALLATIONS FROM THE PUBLICATION,
"PRIMARY WOOD - USING INDUSTRIES IN ONTARIO 1983"/1/

ESTABLISHMENT LEGEND

MILL CLASSIFICATION

Code	
Major	Minor

Sawmill

Chipper-equipped
 Kiln-drying facilities
 Movable/portable
 Planer-equipped
 Specialty/custom saving

S	
	c
	k
	m
	p
	s

MILL SIZE CLASSIFICATION

Saw and Veneer Mills (annual production)

25 000 Mfbm (59 000 m³) and more
 10 000 Mfbm (23 600 m³) to 24 999 Mfbm (58 999 m³)
 5 000 Mfbm (11 800 m³) to 9 999 Mfbm (23 599 m³)
 2 000 Mfbm (4 700 m³) to 4 999 Mfbm (11 799 m³)
 1 000 Mfbm (2 400 m³) to 1 999 Mfbm (4 699 m³)
 Less than 1 000 Mfbm (2 40 m³)

A
B
C
D
E
F

SPECIES CLASSIFICATION

Softwoods

Black and white spruce, jack pine, and balsam fir
 Red and white pine
 Eastern white cedar

SPF
Pr & Pw
Cw

Hardwoods

Ash, basswood, beech, elm, maple, oak white birch
 Cherry, hickory, walnut, yellow birch
 Poplar (aspen) (and white birch)

H Hdwds
Q Hdwds
Po (& Bw)

PRODUCT MARKET AREA

Ontario
 Canada (other than Ontario)
 USA
 United Kingdom
 Other

1
2
3
4
5

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
ALBAN G.W. Martin Lumber Co Ltd Box 70 POM 1A0	Sckp	C	Pr & Pw	1,2,3	Diversified sawmill
CALSTOCK Gosselin Lumber Co Ltd ² Box 1180 HEARST POL 1N0 (705) 362-5812	Sckps	B	SPF	1	
CHAPLEAU Chapleau Forest Products Ltd ² Box 280 POM 1K0 (705) 864-1320	Sckp	A	SPF	1,3	Random dimen- sion and stud lumber
A&L Lafreniere Lumber Ltd ² Box 340 POM1K0 (705) 864-1060	Sckp	B	SPF	1,3	Random dimen- sion lumber, railway ties, mining timer
J.E. Martel & Sons Lumber Ltd ² Box 758 POM 1K0 (705) 864-0870	Sckp	B	SPF	1,3	Random dimen- sion and stud lumber, railway ties, mining timer
COCHRANE Normick Perron Inc ² Box 1050 POL 1C0 (705) 272-4321	Sckp	A	SPF	1,2,3	
COMBERMERE Specialty Forest Products R.R. #2 KOJ 1L0 (613) 756-5464	Sk	F	H Hdws	2	Kiln-dried lumber
DALKEITH Ken MacIennan Sawmill Ltd Box 4 KOB 1EO (613) 874-2034	Sckps	B	H Hdws	1,2,3, 4,5	Specialty sawing

² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
DRYDEN					
Great Lakes Forest Products Ltd Duke Street P8N 2Z7 (807) 223-9327	Sckp	A	SPF	1,2,3	New mill dimension lumber
DUBREUILVILLE IMPROVEMENT DISTRICT					
Dubreuil Brothers Ltd ² Dubreuilville POS 1B0 (705) 884-2525	Sckp	A	SPF	1,3	Dimension and construction lumber
GENIER TOWNSHIP, PINEAL LAKE					
Pineal Lake Lumber Co Ltd 913 Brock Road South Pickering L1W 2X9 (416) 839-1171	Sckps	C	Pr & Pw	1	Custom sawing for windows and doors
GRAVENHURST					
Nelson Wood Products Ltd R.R. #1 POC 1G0 (705) 687-2003	Sckps	E	H Hdws	1	Lumber, ties, pallets, crates, bolts
HARCOURT					
G.W. Martin Lumber Co Ltd ² KOL 1X0 (705) 448-2330	Sckp Mo	A	H Hdws	1,2,3, 4,5	Lumber, chips, puplwood
HAWKESBURY					
Albert Larocque Lumber Ltd ² Box 129, Hwy 34 K5A 2R8 (613) 632-8521	Scks	A	Pr & Pw H Hdws	1,2,3 4,5	Specialty orders
HEARST					
Custom Sawmill (Hearst) Ltd ² Box 460 POL 1N0 (705) 362-4217	Sckps	A	SPF	1	
United Sawmill Ltd ² Box 880 POL 1N0 (705) 362-4227	Sckps	A	SPF	1,3	

² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
Lecours Lumber Co Ltd ² Box 9000 POL 1N0 (705) 362-4369	Sckps	A	SPF	1	
HUDSON McKenzie Forest Products, Inc ² Box 190 POV 1X0 (807) 582-3271	Sckp	A	SPF	1,2,3	Stud Mill
HUNTSVILLE Weldwood of Canada Ltd ² Box 847 POA 1K0 (705) 789-2371	Sckp	B	H Hdws	1	Lumber
KAKABEKA FALLS Kakabeka Timber Ltd Box 78 POT 1W0 (807) 577-7511	Sckps	D	Po & Bw	1,2,3	Interior and exterior panelling, pal- lets, dowels, lumber, chips, shavings
KAPUSKASING Spruce Falls Power & Paper Co Ltd Box 1000 P5N 2Y2 (705) 335-2311	Sckp	A	SPF	1,3	Stud mill
KEEWATIN Boise Cascade Canada Ltd Box 5000 Kenora P9N 3Y1 (807) 468-6663	Sckps	A	SPF Pr & Pw	1,2,3	Ties and lumber stud mill
KIRKLAND LAKE Normick Perron Inc Kirkland Lake Division Box 1120 P2N 3M7 (705) 642-3216	Sckp	A	SPF	1,2,3	Stud mill
LANARK O.E. Rothwell Box 54 KOG 1K0 (613) 259-2126	Sckps	D	H Hdws Pr & Pw	1	Lumber, rail- way ties

² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
LISTOWEL The Andrew Malcolm Furniture Co Ltd ¹ 275 Elma St W N4W 1V7 (519) 291-1240	Sk	F	H Hdws	1	Furniture crafting
LONGLAC Kimberly-Clark of Canada Ltd ² POT 2A0 (807) 876-2224	Sckp	A	SPF	1,2,3	Dimension lumber
MANITOU RAPIDS INDIAN RESERVE 11 Manitou Lumber Co ² Box 300 Emo POW 1E0 (807) 487-2185	Sckp	E	Pr &Pw	1,2,3	
MEAD Newaygo Forest Products Ltd R.R. #1, Mead HEARST POL 1N0 (705) 362-4391	Sckps	A	SPF	1,3	
MONETVILLE R. Fryer Forest Products Ltd POM 2K0 (705) 898-2484	Sckp	D	Pr & Pw	1,2,3	Diversified and integrated sawmill.
MOONBEAM Cayouette Cabinets R.R. #1 POL 1V0 (705) 367-2557	Skps	F	Bw	1	Furniture, dimension lumber
NAIRN E.B. Eddy Forest Products Ltd POM 2L0 (705) 869-4020	Sckps	A	Pr & Pw SPF	1,2,3	
PANINEAU TOWNSHIP G.W. Martin Lumber Co Ltd Mattawa Division R.R. #2 Mattawa POH 1V0 (705) 744-5563	Sckp	B	H Hdws	1,2,3,4	Lumber, chips

¹ Westaire Kiln (see Table A1)² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
PORT ARTHUR Port Arthur Lumber & Planning Ltd ¹ Box 2745 P7B 5G2 (807) 623-1262	Sckps	D	SPF	1	Lumber, chips, pallets, railway ties, mining timber, sawdust, panelling
ST THOMAS Elgin Handles Ltd ² 21 Kains St N5P 1M8 (519) 631-0330	Skp	C	H Hdwds, Q Hdwds	1,2,3	Dimension lumber
SAULT STE MARIE Lajambe Forest Products Ltd 146 Queen St E P6A 1Y5 (705) 949-2010	Scpk	E	H Hdwds	1,3,4,5	
Weyerhaeuser Canada Ltd ² 45 Third Line W P6A 5P7 (705) 949-7800	Sckp	A	Pr & Pw, Bw	1,2,3	
SEARCHMONT Weldwood of Canada Ltd Box 1029 Sault Ste Marie P6A 5N5 (705) 254-3422	Sckp	B	Pr & Pw	1,2,3	
SMOOTH ROCK FALLS Abitibi-Price Inc ² Smooth Rock Falls Division POL 2B0 (705) 338-4910	Sckp	A	SPF	1,2,3	Stud mill
SPRINGER TOWNSHIP Goulard Lumber (1971) Ltd Box 730 Sturgeon Falls POH 2G0 (705) 753-2220	Sckps	C	Pr & Pw	1,2	Lumber, chips
TEMAGAMI Wm. Milne & Sons Ltd ² Box 159 POH 2H0 (705) 569-3630	Sckp	B	Pr & Pw SPF	1,2,3, 4,5	Graded and dimension lumber, chips

¹ Westaire Kiln (see Table A1)² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
TERRACE BAY Kimberly-Clark of Cda Ltd ² POT 2W0 (807) 825-3211	Sckp	A	SPF	1,2,3	
THEDFORD George Coultis & Son Ltd Box 10 NOM 2N0 (519) 296-4978	Skp	E	H Hdws, 1,2,3 Q Hdws		Lumber
THESSALON Midway Lumber Mills Ltd ² Box 430 POR 1L0 (705) 842-3246	Sckps	C	Pr & Pw, 1,3 H Hdws		
TIMMINS E.B. Eddy Forest Products Ltd ² McChesney Lumber Division Box 150 P4N 7C9 (705) 264-2244	Sckps	A	SPF	1,2,3	
Mallette Lumber Inc ² Box 1090 P4N 7J3 (705) 267-1462	Sckps	A	SPF	1,2,3	
THUNDER BAY Great Lakes Forest Products Ltd Box 430 P7C 4W3 (807) 475-2110	Sckp	A	SPF	1,2,3	Stud mill
Great West Timber Ltd Box 3170 P7B 5G6 (807) 344-8464	Sckps	A	SPF	1,2,3	Lumber, pal- lets, chips, fence posts, sawdust, shav- ings, decking, blocks

² COE (Moore) Kiln (see Table A2)

TABLE A3 (Cont'd)

Location, Firm and Mailing Address	Industrial Code	Size Class	Species	Markets	Remarks
Northern Wood Preservers Ltd ² Box 2990 P7B 5G5 (807) 344-8451	Sckps, Mt	A	SPF	1,2,3, 4,5	Poles, pilings and lumber, treated railway ties, chips, sawdust, shavings
WALKERTON					
Bogdon & Gross Furniture ² Box 1240 NOG 2V0 (519) 881-0600	Sks	E	H Hdws	1	Furniture, dimension stock
Canada Spool & Bobbin Co Ltd ² Box 40 NOG 2V0 (519) 881-0360	Sks	D	H Hdws Q Hdws	1,2,3	Specialty products, furniture, turnings, dimension stock
WHITE RIVER TOWNSHIP					
Abitibi-Price Inc ² Box 2000 White River POM 3G0 (807) 822-2100	Sckp	A	SPF	1,3	Construction lumber

² COE (Moore) Kiln (see Table A2)

APPENDIX B

GENERAL INFORMATION GATHERED FROM TELEPHONE CONVERSATIONS

According to a representative of the Forest Industrial Technology Association (Forintek), eighty per cent of the volume of wood dried in the province are softwoods. The softwood kilns are concentrated in the northern regions of the province and provide dimension and stud lumber. He feels that the softwood industry generates a very large volume of scrap and residue by-products that can be used to fuel the kilns. He considers a heat pump dehumidifier is likely unattractive to industries drying softwoods. One of the two softwood mills contacted was interested in getting information on dehumidifiers.

A major lumber supplier in Northern Ontario says that having both heat and vent and heat pump dehumidification type kilns, he feels the latter is unsatisfactory. He found that the heat pump manufacturers claims are in excess of what the equipment is capable of performing. His kiln capacity is 210 MRF and operates from natural gas. He found that his usual drying time of two to three days for studs is extended to about four times this duration when using his heat pump facility. The heat pump is a Uraken and is installed at one of their Quebec kilns. It has the same board-foot capacity.

Forintek gave some design information for the sizing of heat pumps. Compressors are sized dependent on the type and quantity of wood they are drying. Softwoods have more free water than hardwoods and evolve it more readily. A softwood kiln requires a larger heat pump than a similar sized hardwood facility. The first few days of a drying cycle are the critical sizing periods. During this period the evolution of water is high. If the heat pump cannot get rid of this high humidity by a high water extraction rate, then the lumber can stain.

Conversely, the water extraction rate towards the end of the drying cycle is low and becomes more difficult to extract. The compressors size requirement is less and can become inefficient through its oversizing. The new high temperature dehumidifiers can operate up to 80°C and this higher temperature improves the water extraction rate toward the end of the drying cycle. The older heat pumps were capable of only 50°C.

A compromise can be made between these two design considerations by installing a heater and vent which will operate during the early drying stages. The kiln will vent the humidity until the heat pump is capable of handling the vapour load.

A steam administration system is required for hardwood kilns. As the hardwood is dried down near its final moisture content, the tempering steam is required to relieve stresses in the wood.

One kiln operator cited the slow-down in the drying process near the end of the cycle as being unacceptable. He felt that heat pumps can be used as predriers but the final drying should be done in a conventional kiln.

A heat pump supplier described a high temperature dehumidifier kiln operating beside a competitor's low temperature installation. These operations are outside of this province but are noteworthy in that the high temperature kiln has a more serious corrosion problem (rust) than the low temperature model. It would seem impractical to use iron products in the construction of kilns.

APPENDIX C
PEOPLE CONTACTED

NAME	LOCATION
Forintek (Mr. F. Pfaff)	800 Montreal Rd, Ottawa (613) 744-0963
Ontario Furniture Manufacturers' Association (Mr. K.M. Campbell)	6900 Airport Rd, Mississauga 677-6561
Coe Manufacturing (Messrs. J. Fletcher, T. Cuthbertson)	P.O. Box 68, Brampton 451-4990
Westaire Systems Inc (Messrs. L. Randall, D. Barker)	7290 Torbram Rd, Mississauga 677-5222
Uraken (Mr. A. Choquette)	553 Boulevard Industriel St-Eustache, Quebec (514) 472-7270
<u>Kiln Operations</u>	
Peter Thomson & Sons (Mr. J. Thomson)	Alliston, (705) 435-6258
Elora Furniture Company (Mr. J. Walser)	Elora, (519) 846-5348
Albert LaRocque Lumber Co (Mr. V. LaRocque)	Hawkesbury, (613) 632-8521
Jones Wood Specialties Ltd (Mr. R. Zang)	Scarborough, 291-8457
Ontario Hardwood Products Ltd (Mr. J. McNicholl)	Bolton & Scarborough, 535-3191
Edwards, D. Kemp Ltd (Mr. Lavoy)	Ottawa, (613) 728-4631
Andrew Malcolm Furniture Ltd (Mr. K. Parrot)	Listowel, (519) 291-1240

Simpkin Wood Manufacturing
(Mr. R. Simpkin)

Roxton Furniture Ltd

Kaufman Furniture Ltd

Abitibi-Price Inc
(Mr. Gonial)

Normick Perron Inc
(Mr. R. Lecroix)

Campbellford, (705) 653-3785

Elmira, (519) 669-5181

Collingwood, (705) 445-6000

Smooth Rock Falls,
(705) 338-4910

Kirkland Lake,
(705) 642-3216